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psychology, which describes and explains the modifications of the human intelligence caused by disease; and, finally, a general psychology, which, without taking up all the details of its subject-matter with their analyses and comparisons, strives to bring to a focus the facts of which the details are numberless. In a word, general psychology attempts to form a synthesis, profiting by the analyses made by human and comparative psychology.

For general psychology, as for general physiology, but one method is possible, — the experimental. And as to this, a short explanation is essential, in order that a confusion too frequently made may be avoided. As a matter of fact, an opinion, very easy of refutation, is frequently attributed to the defenders of experimental psychology. They are said to admit nothing but experience, and to deny the validity of introspection or the internal sense. But, on the contrary, no physiologist has ever thought of setting aside the subjective observation of the elements of knowledge. How can we study the effects of memory or of imagination, unless we observe ourselves? Who is the physiologist or naturalist that upholds this opinion? and why combat it, when no one defends it? Internal observation gives us a psychology based on experience which is quite as legitimate and quite as fruitful as the most thoroughly experimental physiology can be imagined to be. The facts gained from the study of the *ego* are quite as valuable, provided they have been observed carefully and methodically, as the physiological phenomena recorded in the laboratories by the most perfect methods that our modern technique has devised.

But, however important this internal observation may be when it addresses itself to consciousness, it can be applied to but a single object, the knowledge of the *ego*. Beyond this it is dangerous and sterile. In is not internal observation which tells us how the stars move, and what the properties of matter may be. It knows and studies the *ego*. It observes itself, it judges itself, but it is forbidden to leave this domain of the *ego*, — a domain so vast that numberless discoveries are yet to be made in it, and yet so narrow that the *ego's* unsatisfied curiosity urges it eagerly beyond it. But here science alone, with its rigorous methods, its accurate apparatus, and its exact measurements, can make a progress which is slow but sure. In a word, introspection can only hope to know the facts of consciousness. The general properties of organic matter, whether it be inert or endowed with thought, remain for it unknown. They fall within the province of physics, chem-

istry, and physiology. Introspection can only judge phenomena.

But this is common to all the sciences. Nevertheless it applies particularly to psychology, which proceeds by introspection carried on with great care. For psychology cannot experiment: it can only observe. And it is well known that sciences founded upon observation are not so rich as are sciences of experiment, in conclusions of various and far-reaching import. Under all circumstances we are forbidden to ratiocinate, that is to say, to construct systems of metaphysics and of transcendental physics. That which psychology can do, and which it alone can do, is to observe the phenomena of consciousness. Beyond that, it is but an illusion.

Thus general psychology, aided now by introspection, now by the study of organic beings, now by experiment, extends from the lowest animal all the way up to man. But is this its whole sphere? For our part, we do not hesitate to say yes; for, if there should exist in nature intelligences or conscious powers analogous to those of man, they have not yet been revealed to us. Assuredly it would be absurd to suppose that this earth alone, among all the infinity of worlds, is the only portion of space where intelligent beings exist. The very fact that men exist on the earth renders it extremely probable that life has appeared on other stars also, and that there exist there intelligences similar to ours. The chemical composition of the stars is almost the same as that of our planet, and consequently the same phenomena ought to be manifest there as here. But our feeble science cannot go so far. We are limited to a terrestrial psychology, which is probably the only one of which man can ever know any thing. Though thus restricted to the animal world and to the consciousness of the *ego*, general psychology, presenting facts in their totality and not in detail, is not only a science of immense scope, but the most attractive of all the departments of human knowledge.

CHARLES RICHET.

GEOGRAPHICAL NOTES.

Europe.

Some more detailed news of the Riviera earthquake of Feb. 23 has been received. The facts, so far as they are of scientific interest, are summed up by Father Denza of the Montcalieri observatory. He states that the shaken area extended to the east along a line leaving the plains of Lombardy at Lomellina, and passing by the district of Alessandria to the Riviera di Levante, and westward, over all the western Alps, proceeding to-

wards Switzerland as far as Geneva and beyond, and to Paris and Corsica. The centre of greatest intensity was in the Gulf of Genoa, along a line dividing the place where the Apennines join the Alps, and extending from Savona to Mentone. The earthquake spread over the valley of the Bormida, and did considerable damage in a portion of the province of Cuneo, as also in the provinces of Alessandria and Turin, it being very intense on Mont Cenis. It was slighter on the plains and in the valley of the province of Novara. In the places where the earthquake was most intense the principal shocks were three in number, and with a slight difference, depending probably on the difference of clocks, correspond to the times indicated by the seismic instruments at Montcalieri; namely, the first at 6.22 A.M., the second at 6.31, and the third at 8.53. In the places near the centre of motion slight shocks occurred at intervals all through the day. The severest and most terrible shock was the first, which was undulatory in several places, oscillatory, and perhaps rotatory. It was several times prolonged and accentuated. At Montcalieri, as well as at Turin and elsewhere, it had three principal repetitions, plainly evidenced by the courses traced by the registering seismograph. These augmentations of intensity were mistakenly regarded by some as so many distinct shocks. The dominant direction of the first undulatory shock was from west to east, with slight deviations at intervals from west and north-west to east and south-east, and with oscillatory and very slight vibrations. The two other shocks were also undulatory, and the last was rather more intense than the second, but without reaching the intensity of the first. The second and third had about the same direction as the first. The earthquake, in places where it was very severe, was accompanied by rumblings. It will be remembered that slight shocks continued during the following days. These have occurred at intervals since, the latest being reported on March 11. At Mentone and Porto Maurizio these shocks were the most violent ones since Feb. 23.

A scientific and industrial exhibition will be opened at Ekaterineburg in May next. The mining industries of the Ural Mountains will be well represented. Special interest will attach to the department of ethnography, as it has been arranged that there shall be in the exhibition a number of families belonging to the native tribes of the Ural Mountains and Siberia. Their dwellings will be exactly like those in which they usually live, and they will have with them the weapons and implements used by them in hunting and fishing. Another important element will be a collection of ancient objects in stone, bone, clay, and

metal, found in Siberia and among the Ural Mountains. These objects have never before been publicly exhibited.

Oxford has agreed, in answer to the representations of the Royal geographical society, to found a readership in geography, bearing all the expense thereof. Cambridge has determined to take a similar step, the geographical society paying half the stipend of the lecturer.

Asia.

The Russian traveller M. Ogorodnikoff was told at Meshed that there are tin-mines near that city and in various parts of Khorassan. In an article in the *Revue scientifique*, M. Berthelot points out that this accords with a passage in Strabo, who speaks (book xv. ch. ii. 10) of tin-mines in Drangiana, the ancient name for the region now called southern Khorassan. If there really have been tin-mines in this district from time immemorial, there can be little doubt that they supplied the tin for the bronzes of ancient Egypt and Assyria.

Krasnof, who was sent out by the Russian geographical society to explore the Khan-tegri, finished his exploration of the Balkash region, and went to Kara-Kul last summer, where he intended to join his companion, I. V. Ignatief. He reports that the river Kara-Soo, which is indicated in the maps, does not exist. He found only a small water-course called Kara-Sai, which is dry at all seasons. All the rivers coming from the mountains of At-lesken are long since dried up. The Ala-Kul has so little water that the Kirghis have been able to cross it on horseback ever since about five years ago, the horses having to swim only fifty yards. In spring the rivers are higher. The water of the west side of the lake is fresh, that of the central part brackish, and in the northern parts it deposits salt. The desert can easily be crossed in all directions, the Kirghis knowing many routes; and, particularly in summer, water may be met with about every forty miles. The river Ili is probably being deflected eastward. The water is stagnant in the beds of its delta, and no floods have occurred in its tributaries during the past three years, while the quantity of water in the Kurlu seems to be increasing. The district of Kaman abounds in woods and reeds. The Kirghis used to cultivate rice here. At the present time wheat is cultivated only in several districts of the desiccated lakes, which require no irrigation. In the Khan-tegri, Krasnof and Ignatief discovered an enormous glacier. When about to cross the frontier of China, they were sent back, as the Chinese authorities were not notified of their intention to visit Chinese territory.

Africa.

The Mongalla, one of the northern tributaries of the Kongo, the lower part of which may be seen on the sketch-map contained in the last issue of *Science*, has been explored by Lieut. E. Baert, who ascended it on the small steamer belonging to the station of Bangallas. He followed its course for two hundred and twenty miles, when his progress was stopped by rapids. Its course is very meandering, similar to that of the Biverre. The country around the river is hilly, and inhabited by the Sebi, who are, like other tribes of central Africa, very good blacksmiths. The rapids of the river are in latitude $3^{\circ} 30' N.$, and longitude $22^{\circ} W.$ If this position be correct, Junker's Ali-Kobo will probably be a little farther north. The direction of the Mongalla is north-east and south-west: its valley is densely wooded.

Lieutenant Webster, late commander of the station of Stanley Falls, has returned to Brussels, and gives a description of the Mburu, the eastern tributary of the Kongo emptying near Stanley Falls. He ascended the river for two days in a canoe. At the mouth it is about 1,100 feet wide. On the northern side, a little above the mouth, it has a tributary called 'Lindi,' which comes from the north-west and is about six hundred feet wide. The main river is called by the natives 'Anki-ambo.' It seems to come from the east. At the farthest point reached by Webster it is eight hundred feet wide. In two places there are rapids. The country is wooded and abounds in elephants. It is inhabited by the Wabeda, who have villages of two or three thousand inhabitants on the middle part of the Mburu.

According to a telegram published in the *Mouvement géographique*, Tippu-Tip has declared his submission to the Kongo Free State, and expressed his regret as to the attack on the station of Stanley Falls which occurred during his absence. As he has a great influence in central Africa, his submission will probably lead to the re-establishment of the stations on the upper Kongo.

The Stanley expedition for the relief of Emin Pasha, which left Zanzibar about three weeks ago, arrived at Cape Town on March 9, and proceeded for the Kongo the next day.

News has been received from Emin Pasha to the effect that in November last he went to Uganda, and that King Mwanga refused to permit him to go through the country. Then Emin Pasha tried to effect a passage out through Karagwe, on the western shore of Lake Nyanza. In this he also failed. He then returned to Wadelai, leaving a detachment of soldiers at Unyoro under the command of Casati, his sole European companion.

America.

The missionary E. I. Peck has succeeded in crossing Labrador from west to east. In the winter of 1882, in the summer of 1883, and in the winter of the same year, he failed in his endeavors to reach Fort Chimo in Ungava Bay. In 1884 he started from his station on Little Whale River on July 17, and reached Fort Chimo on Aug. 11. He travelled by boat on the numerous lakes and rivers of the peninsula, and while crossing Clear Water and Seal lakes. The numerous watersheds and rapids of the rivers he passed by making portages. From his journal, which has been published by the *Church missionary intelligencer* in 1886 (p. 510), it appears that the maps are unreliable; but he has not made any observations which would enable us to correct the errors of the maps. The geography of this district is still very little known. It is even doubtful whether the western half of Labrador belongs to the mainland, as, according to some reports, there exists a connection between Mosquito Bay on the east coast of Hudson Bay, and Hope Advance Bay in Ungava Bay.

In the *American naturalist* for January, 1887, Mr. John Murdoch publishes a paper on some popular errors in regard to the Eskimos. He points out that there is no evidence of polyandry among this people; that they do not live in underground dens, keeping up their internal heat by enormous meals of raw blubber washed down with draughts of lamp-oil; and that they are not at all of dwarfish stature. Though we concur with the main points of the author's opinions, we wish to add a few remarks. Murdoch quotes Graah as the only reliable authority who knew by report that the East Greenlanders practised polyandry. The best authority on this subject is Ross, who lived from 1829 to 1833 among the Eskimos of Boothia Felix. In his 'Narrative of a second voyage in search of a north-west passage' (London, 1835, pp. 356 and 373), he refers to two brothers who had one wife, and mentions this as a thing of frequent occurrence. Probably, however, it is not real polyandry, but a state of things brought about by the prevailing custom among them of lending the wife to an intimate friend. Murdoch says that the winter houses in the great middle region, from Hudson Bay northward, are generally of snow, built upon the frozen ground. Throughout this district dug-out winter houses are in frequent use. They have a subterranean entrance, the rear part of the roof being at a level with the ground, and the front being formed by a large whale-rib covered with seal intestines, which admits the light. The roof is made

of beams, over which are spread two covers of seal-skin, the intermediate space being filled with shrubs. In referring to Sutherland's measurements of the Eskimos of Cumberland Sound, Murdoch remarks that they may have been half-breeds. Sutherland visited the Sound only a few years after its discovery; and there were no grown-up half-breeds there at that time, though they form a large portion of the population nowadays. The tribes of that district are in the habit of cooking the food for their regular meals; but besides this, they eat large quantities of raw and frozen meat. They indulge in drinking oil as little as any other tribe. Murdoch remarks rightly that it is far too valuable to waste in this way, as it is the only and indispensable fuel.

NOTES AND NEWS.

THE board of oriental studies at Oxford has added Chinese and Burmese to the list of languages which may be offered in the examination.

— Prof. Edward A. Freeman has been obliged by ill health, the result of overwork, to obtain leave of absence from Oxford for a time. He is now in Sicily.

— The report of the Swiss commission for the reform of gymnasial instruction has just been issued. The commission recommend that the teaching of Latin shall begin in the fifth class, and shall be continued, for five hours weekly, up to the highest class; that instruction in Greek shall depend upon the expressed desire of parents or guardians, and shall begin in the fourth class; and that all scholars who do not learn Greek shall learn either English or Italian. Two spare hours gained by pupils in English or Italian are to be spent in the study of natural science and mathematics.

— The *Educational times* remarks that the event of the month — January — has been the visit of the French teachers to Oxford — the members of the Société nationale des professeurs de Français en Angleterre — for the holding of their sixth annual congress. They lunched at different colleges, and assembled thereafter in Balliol hall, where they were received in a most eloquent speech by Dr. Jowett. That master spoke highly of the value of modern languages and the promotion of their study in England; but he loves his Greek better. "Modern languages in Oxford," he said, "must serve the higher purposes of education: therefore they must not drive out the ancient, and, above all, Greek, which, more than any other ancient language, seems to be the original source of our literature and civilization."

Other speeches were made, and the following excellent resolutions were carried: "1. That the Society of French masters earnestly desires to see established at Oxford a school of modern languages, on such a basis as will encourage the study of French literature, and of the French language as a living tongue; 2. That the society desires that the system of set books in the local examinations of Oxford and Cambridge be abolished, and that certificates be awarded on translation at sight, composition, grammar, and *viva voce*." Later, the members dined together at Oriel, where they were entertained by the provost and a committee of reception. Toasts and more speeches followed dinner; Dr. Beljame, the representative of the French minister of public instruction, expressing an eloquent hope that the old friendly intercourse between French and English universities would be renewed. Altogether, the Oxford meeting was a very pleasant success, enjoyable, and of much benefit to all concerned.

— The English educational papers are bewailing the appointment of Sir William Hart Dyke to succeed Sir Henry Holland as vice-president of the council of education.

— Hawaii is not unprovided with educational facilities. The education act compels the attendance at school of all children between the ages of six and fifteen. The government supports free public schools out of a tax of two dollars per head, paid by every male inhabitant of the kingdom between the ages of twenty and sixty years. An inspector-general is at the head of the school department, but no person in holy orders or minister of religion is eligible to fill the office.

— An association for promoting the university education of teachers, consisting, in the first place, of the masters of English elementary schools who spent some weeks at Oxford last summer, has been inaugurated in London. As its first act, the association has appealed to the education department to recognize the university degree as equivalent to a certificate, "provided the universities co-operate by making provision for training in teaching."

— Of late the Prussian minister of education has had several applications made to him to admit women as students at the universities. His reply is, that women are not to be admitted as regular students at any Prussian university, nor at any of the medical schools.

— Cornelius Nepos is a particularly good author for beginners in Latin to take up, because his style is easy and perspicuous, and his subject-matter, when trustworthy, is of historical interest. The